could also be concealed more efficiently than the loss of a complete frequency band.

According to a fourth aspect of the present invention, instead of an arrangement of the priority and non-priority code words which increases linearly with the frequency an arrangement can also be used in which e.g. only each n-th code word is arranged in the raster and the remaining code words are slotted between them. As has already been stated, the number of raster points for a bit stream is limited by the total length and the distance between the raster points. If e.g. sampling with low bandwidth is considered, the case can occur that the vast majority of the code words are psychoacoustically significant code words since the whole signal has a theoretically possible useful bandwidth of 8 kHz if a sampling rate of 16 kHz is used. Experience shows that only 30% of the code words can be arranged on raster points, the other 70% being required to fill up the raster completely. This would mean, however, that the important frequency range, the range 0 - 4 kHz for speech signals e.g., cannot be covered or "protected" with priority code words arranged on raster points. To achieve adequate protection against error propagation for the important frequency range, therefore, instead of aligning every priority code word with a raster point this is done only for every second, third, fourth, etc. priority code word, while the other priority code words fill up the raster without being aligned. If e.g. every second or every third etc. spectral value is known in the low frequency range and the interspersed code words are corrupted during transmission, it may be possible to reconstitute these code words in the decoder using error concealment techniques, e.g. prediction or similar.

The methods and devices for decoding a bit stream operate in such a way as to reflect the cited coding.

In a general method for decoding a bit stream representing a coded audio signal where the coded bit stream has code words of different length from a code table and a raster with equidistant raster points (10, 12, 14), where the code words include priority code words which represent certain spectral values which are psychoacoustically important compared with other spectral values and where priority code words are aligned with raster points, (a) the distance D1 between two adjacent raster points is determined. If the distance between two raster points is known, (b) the priority code words in the coded bit stream which are aligned with the raster points can be resorted so as to obtain an arrangement in which they are ordered linearly as regards frequency and the start of a priority code word coincides with a raster point. The priority code words now appear in the general frequency-linear arrangement shown in Fig. 2, so that (c) the priority code words can now be decoded with a code table with which they are associated so as to obtain decoded spectral values. After (d) transforming the decoded spectral values back into the time domain, a decoded audio signal is obtained, which can be processed in some known way, e.g. in order to feed it into a loudspeaker.

If the bit stream is coded with just one code table, the distance between the raster points can be established quite simply by finding out from the side information of the bit stream which table was used for coding. Depending on the coding, the distance might then be the length of the longest code word of this table, which could be set permanently in the coder. If the distance is the length of the longest code word actually occurring in a part of the bit stream to which a code table is assigned, this is communicated to the decoder in the side information which is assigned to the bit stream, and so on.

The decoder performs a resorting of the priority code words and also of the non-priority code words, e.g. by applying a

pointer to the coded bit stream. If the raster distance is known to the decoder and the priority code words are arranged linearly with frequency, the decoder can jump to a raster point and read the code word which starts there. Once a code word has been read the pointer jumps to the next raster point and repeats the process just described. After all the priority code words have been read, the bit stream still contains the non-priority code words. If a linear arrangement of the priority code words and the non-priority code words in the bit stream was chosen, the non-priority code words are already arranged linearly with frequency and can be decoded and transformed back without further sorting.

If coding according to the third or fourth aspect of the present invention has been chosen, either scramble information can be transmitted as side information or the scrambled distribution is fixed a priori and is thus known to the decoder from the start. The same considerations apply to the fourth aspect. It is always possible to stipulate a fixed distribution or to choose a variable distribution which is communicated to the decoder as side information.

An advantageous way of determining and manipulating the priority code words will now be discussed. After establishing a raster for a coded bit stream, either by specifying the raster distance when using just one code table or the raster distances when using a number of code tables, the priority code words must be so positioned in the raster that each priority code word coincides with a raster point.

According to a preferred embodiment of the present invention this positioning is achieved by inserting the code words sequentially into the essentially empty raster from a kind of sort table. A start is made with the first code word in the table. The priority code words can thus be influenced by the